



Lake Michigan Fact Sheet

STATE OF LAKE MICHIGAN

The Great Lakes Water Quality Agreement (GLWQA) calls for lakewide planning to focus on reducing the discharges of pollutants to the waters of the Lake Michigan ecosystem to restore and protect the ecological health of the Lake. Pollutants in Lake Michigan are not the only cause of existing or potential impairments. Habitat loss and shifts in species composition are also important factors contributing to the degradation of the quality of the ecosystem. Despite reductions in ambient levels of toxic pollutants during the past 20 years, data indicate toxic pollutants still exert negative impacts on the physical and biological components of the Lake Michigan ecosystem.

GLWQA mandates that the Lake Michigan Lakewide Management Plan (LaMP) address 14 warning signs of an impaired ecosystem, called beneficial-use impairments. The LaMP has identified those pollutants that contribute to, or have the potential to contribute to, these 14 symptoms. The extent of contamination problems and the frequency of their occurrence are both important considerations in the designation of LaMP pollutants. The Lake Michigan Technical Coordinating Committee (cooperating tribal, State, and Federal agencies) is in the process of finalizing information on the use impairments using the proposed pollutants list from the 1993 LaMP draft. The next steps will be to determine sources and set load reduction targets followed by implementation of prevention, reduction, and remediation activities. Data collection and monitoring will be used to measure progress.

14 Symptoms of an Impaired Ecosystem

The Great Lakes Water Quality Agreement mandates that the LaMP address the following 14 warning signs (called beneficial-use impairments). The LaMP intends to identify all causes for these 14 symptoms and implement programs to restore a healthy ecosystem.

1. Restriction on fish and wildlife consumption;
2. Tainting of fish and wildlife flavor;
3. Degradation of fish and wildlife population;
4. Fish tumors or other deformities;
5. Bird or animal deformities or reproduction problems;
6. Degradation of benthos;
7. Restriction of dredging activities;
8. Eutrophication or undesirable algae;
9. Restriction on drinking-water consumption, or taste and odor problems;
10. Beach closings;
11. Degradation of aesthetics;
12. Added costs to agriculture or industry;
13. Degradation of phytoplankton populations; and
14. Loss of fish and wildlife habitat.

SOLEC Findings

The 1994 Canada/U.S. State of the Lakes Ecosystem Conference (SOLEC) findings for Lake Michigan were:

- Environmental quality in the basin generally is best in the north, and deteriorates to the south.
- Of the 10 Areas of Concern (AOCs - the most degraded areas) the Grand Calumet River/Indiana Harbor Ship Canal, Milwaukee, and Green Bay AOCs are the largest and most degraded, although the Kalamazoo River contains very large quantities of polychlorinated biphenyls (PCBs).
- The sea lamprey has eliminated all stocks of native Lake trout, and severely depressed whitefish and other aquatic populations. The future of the aquatic community is uncertain.
- Sport fishery remains productive, based upon hatchery-reared salmon and Lake trout statistics. The goal of self-sustaining Lake trout populations through natural reproduction remains elusive. Whitefish populations, on the other hand, are increasing and support a valuable commercial fishery.
- Habitat loss (especially wetlands) is widespread in Lake Michigan, particularly in the southern portion of the Lake. Urban sprawl and recreational development continue to destroy habitat and biodiversity.
- Bioaccumulative, persistent toxic substance levels in fish are similar to levels in Lake Ontario, and are among the highest in the Great Lakes basin, resulting in a number of fish advisories.
- A Mass Balance Study is currently underway to determine how toxic contaminants move into and travel through the Lake ecosystem.

Lake Michigan LaMP Pollutants

A Critical Pollutant Work Group, consisting of technical staff from U.S. Environmental Protection Agency (EPA), U.S. Fish and Wildlife Service, U.S. Geological Survey (USGS), and the four Lake Michigan states, developed a process for listing and delisting substances as LaMP pollutants and identified those chemicals which, based on existing information, are impacting Lake Michigan and its watershed. Consistent with the recommendations of the work group, EPA recommended LaMP pollutants be categorized into three levels based on degree of association with use impairments and spatial distribution or frequency of occurrence.

Subsequent LaMP management activities also would be tiered based on a pollutant's classification.

The GLWQA defines critical pollutants as substances that exist at levels that impair beneficial uses due to their presence in open lake waters, their ability to cause or contribute to a failure to meet Agreement objectives, or their ability to bioaccumulate. For the purposes of the Lake Michigan LaMP, EPA proposes "critical pollutants" (Level 1) as those substances that violate the most stringent federal or state water quality

standards or criteria in nearshore and/or open lake waters of Lake Michigan, exceed a Food and Drug Administration action level in Lake Michigan fish, or contribute to use impairments on a lakewide basis (i.e. in open-lake waters or in multiple nearshore Lake Michigan and/or tributary waters). Based on available information regarding the pollution of Lake Michigan and the effects or potential effects of the pollutants on aquatic life, wildlife, and humans, EPA has proposed the following pollutants as critical pollutants (Level 1) for Lake Michigan: total polychlorinated biphenyls (PCBs); dieldrin; chlordane; dichlorodiphenyltrichloroethane (DDT) and degradation products; polychlorinated dibenzo-para-dioxine (dioxins); polychlorinated dibenzofurans (furans); and mercury.

EPA proposes “pollutants of concern” (Level 2) as those pollutants that cause or contribute to use impairments on a local or regional basis (i.e. only at one or a few locations, including an AOC) or for which there is evidence that loadings to, or ambient concentrations in, the Lake Michigan watershed are increasing. Management actions for these substances will emphasize pollution prevention efforts, available load reduction opportunities, and additional information collection. Pollutants of concern include any chemicals associated with a use impairment in an AOC, if it is not already listed as a critical pollutant. In these instances, the LaMP process will not duplicate or interfere with AOC Remedial Action Plan (RAP) efforts. EPA believes listing pollutants associated with impairments in only one or a few AOCs as LaMP pollutants of concern recognizes that these substances are present in the Lake

Michigan watershed, have been associated with an impairment, and may be transported into the Lake if control measures are not taken. When the RAP process determines that a chemical no longer contributes to use impairments in any Lake Michigan AOC, it will be considered for removal from the LaMP pollutant list.

EPA believes listing chemicals with increasing loads and/or concentrations and those that cause impairments in AOCs as LaMP pollutants of concern is consistent with its pollution prevention policy. This approach will allow participating agencies to prevent or reduce pollutant loads prior to their causing a lakewide problem. Based on available data, EPA is proposing the following pollutants of concern for Lake Michigan: hexachlorobenzene; toxaphene; polycyclic aromatic hydrocarbons (PAHs); lead; copper; cadmium; and zinc.

Proposed “emerging pollutants” (Level 3) are those toxic substances that, while not presently known to contribute to impairments or to show increasing loadings or concentrations, have characteristics indicating a potential to impact the physical or biological integrity of Lake Michigan. These characteristics include presence in the watershed, ability to bioaccumulate, persistence, and toxicity.

EPA is proposing the following “emerging pollutants” for Lake Michigan: atrazine; PCB substitute compounds; and selenium.

POLLUTANTS: LAKE MICHIGAN LaMP		
Level 1 Critical Pollutants	Level 2 Pollutants of Concern	Level 3 Emerging Pollutants
Total PCBs	Hexachlorobenzene	Atrazine
Chlordane	Toxaphene	PCB substitute compounds
Dioxins	Cadmium	Selenium
Mercury	Copper	
Dieldrin	Arsenic	
DDT/DDD/DDE	PAHs	
Furans	Chromium	
	Zinc	
	Cyanide	

<i>Pollutants</i>	<i>Sources</i>	<i>Concerns</i>
Polychlorinated biphenyls (PCBs)	PCBs were widely used in the U.S. from 1929 to 1978 for various purposes, including hydraulic fluids and lubricants. Pursuant to the Toxic Substances Control Act in 1979, EPA prohibited the manufacture, distribution, and many uses of PCBs. PCBs are still used in some closed electrical equipment because of high heat resistance, and stability.	PCBs are highly bioaccumulative and persistent. All of the Great Lakes have fish consumption advisories based on PCBs. PCBs have been shown to cause liver cancer in laboratory animals and are probable human carcinogens.
Mercury	A natural element, mercury was once widely used by the pulp and paper industry and in the manufacture of chlorine and caustic soda. Coal-burning power plants and waste incinerators are among active sources though degassing of mercury from the earth's crust may exceed anthropogenic releases.	Mercury is converted in lakes to methylmercury (the organic form of mercury) by bacteria under low oxygen conditions. Methylmercury is highly bioaccumulative. Symptoms including deafness, blindness, and death have been associated with the long-term ingestion of mercury contaminated fish. Fish advisories based on mercury are in effect for the St. Mary's River and Lake St. Clair, 10,000 inland lakes in Michigan, and 400 others in Minnesota and Wisconsin.
Polychlorinated dibenzoparadioxins (PCDDs or dioxins)	A family of structurally related chemical compounds, dioxins were present in fungicides and herbicides. Dioxins are also generated by chlorine bleaching in pulp and paper manufacture. They are also a byproduct of combustion of organic material containing chlorine.	Dioxins are highly bioaccumulative and persistent. 2,3,7,8-TCDD, the most toxic of a chemical family of 75 compounds, is an extremely potent animal carcinogen and teratogen. In humans, it has been linked to a skin disease. A recent epidemiological study of occupational exposure to dioxin found greater incidence of cancer among highly exposed persons. EPA launched a new assessment of dioxin's risks in 1991.
Polychlorinated dibenzofurans (PCDFs or furans)	A family of structurally related chemical compounds, furans are present in chlorophenols and derivative herbicides, are a byproduct of the combustion of chlorinated organic matter, and are generated by chlorine bleaching in pulp and paper manufacture. Furans were also an inadvertent contaminant to some PCB products.	2,3,7,8-TCDF is inferred to be one-tenth as toxic as 2,3,7,8-TCDD, but it has similar toxicological properties. Other PCDFs show a similar toxicological relationship to their PCDD analogs.
Dieldrin	An insecticide introduced in 1946, dieldrin was widely used until restricted by Wisconsin and Michigan in the late 1960s and restricted by EPA on a national basis in 1974.	Dieldrin is a probable human carcinogen.
DDT and metabolites (DDE)	An insecticide introduced in 1946, DDT was widely used until banned by Wisconsin and Michigan in the late 1960s and by EPA on a national basis in 1972. Environmental concentrations have fallen significantly since that time. States still receive unused DDT stocks turned in by U.S. farmers.	DDT is converted to DDE by natural processes. DDE is highly bioaccumulative and persistent. It is known to cause eggshell thinning in birds and benign tumors in laboratory animals.
Chlordane	Chlordane was once widely used in a variety of pest control applications. EPA restricted its use in 1978. In 1969, manufacturers voluntarily cancelled all remaining uses of chlordane, with the exception of fire ant control in power transformers.	Chlordane is a probable human carcinogen and has a high potential for bioaccumulation.

You Are What You Eat

Fish Advisories

One of the persistent use impairments for Lake Michigan is the need to set fish advisories on fish consumption. These will vary from species to species and from year to year. State Natural Resources and Public Health agencies work with the Water Quality Agencies to determine the annual advisories. Nursing mothers, pregnant women, and women who intend to have children should exercise caution in their choice of fish and preparation methods. Restrictions on fish consumption should also be placed on small children. For information on specific fish advisories in your area, contact your local health department.

Fish Cleaning Guide

Most of the toxic PCBs are in the fatty parts of a fish. By removing these fatty parts, you can reduce the amount of PCBs you eat.

Here's what to do:

1. Trim fatty areas--the belly, the top of the back, and the lateral sides.
2. Remove or put holes in skin before cooking. This lets the fat drain off.
3. Cook so fat drains away. Bake, broil, grill or poach and throw away the liquid. Do not fry or make soups.
4. Deep-fry trimmed fillets in vegetable oil. Throw away oil after cooking.

